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AUGUST 1941

Defense!

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

A stirring call to confidence in democracy—a bristling challenge to the farmers of America to complete the high task they have begun so well—is Dr. Bennett's inspiring article, "Look At America."

UNITED STATES DEPARTMENT OF AGRICULTURE - WASHINGTON

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WELLINGTON BRINK
EDITOR

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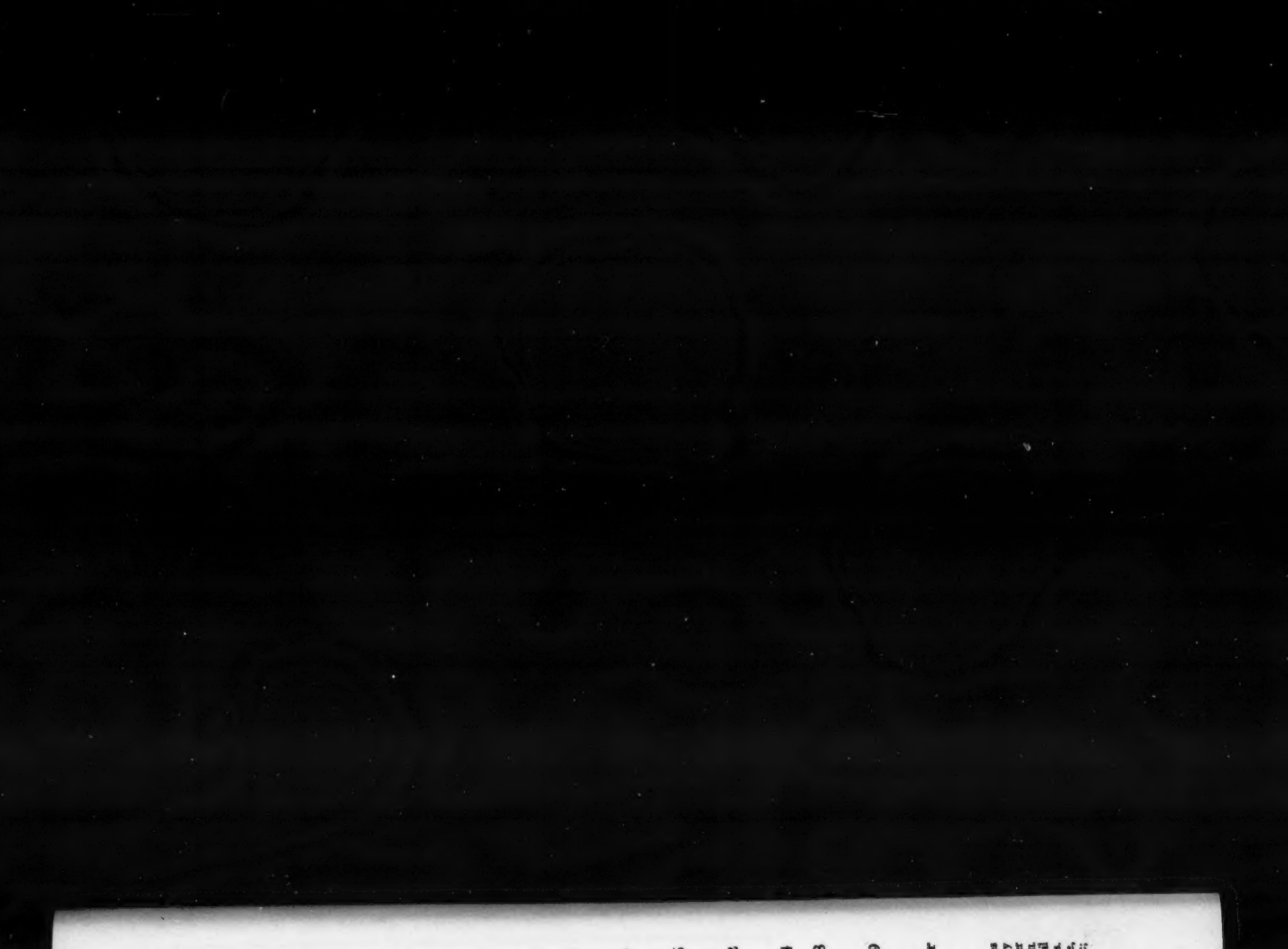

"Look At America"—A Great Democracy Does Things!

By Hugh Hammond Bennett, Chief, Soil Conservation Service

The most important thing in the lives of Americans today is the great world conflict now raging on three continents. The peril it holds for us is clear. We are in very real danger. When the armies of the Axis marched a few weeks ago into the biggest country of them all it was another in a long series of moves and counter-moves that have increased the peril to America day by day.

We are working with all our energies now, to make this nation stronger and stronger—internally and in military might. That is our first concern. But because we are hastening to make ourselves invincible, it does not follow that this democracy of ours is weak. Quite to the contrary, we are very strong. It is almost amusing to hear dictators shout "Democracy can't match our efficiency," and "Democracy is decadent." To that kind of talk we have an unbeatable answer: "*Look at America!*"

Look at America, and see what democracy has done. Look at Grand Coulee Dam, the biggest masonry structure ever built by man. Behind its great wall, 553 feet high, will be stored *three trillion* gallons of water. The electricity generated there will furnish light and power to thousands of homes; the waters backed up will spread through a vast irrigation system, bringing life and productivity to hundreds of thousands of acres of land, opportunity and security to thousands of our people. Yet you might say we just tossed off Grand Coulee in our spare time. We paid good prices for all the materials we used. We didn't force men to work there. We paid them the highest wages in the world, and we worked them short hours. How's that for an out-of-date, tottering old democracy?

We hung a bridge almost a mile long across San Francisco Bay. We built over 400,000 miles of paved highways, connecting every city, village, and hamlet in the country. We have almost half the world's telephones, five times as many as any other country on earth. We have more refrigerators, washing machines, automobiles, farm equipment, radios, bathtubs, and schools than any country anywhere. We have built skyscrapers 1,250 feet high. We dug the Panama Canal. Is there anything we haven't done?

Any *one* of these things would be a major accomplishment for the dictators. They would advertise it to the world and boast about it to their people. We take such things in stride. We are used to it. We do something like that every day. Tomorrow we will do more, and next year more than that. No, we are not at the doddering stage yet.

Recently I read in one of the magazines about a European King, now exiled from his Nazi-conquered country, who told an American newspaper correspondent how 14 young men were selected to be trained for government jobs in his country. Seven of them were sent to England to study and the other seven to the United States. The King told the reporter that the seven who went to England were very smart and were now holding down important government positions.

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The news writer asked, "What about those who went to America?"

"They were even smarter," said the King. "They stayed there."

We have our faults to be sure; our society isn't perfect; there are a lot of problems to be solved; but we are the envy of every other people in the world. With all our shortcomings, we are the richest, the strongest, and the most fortunate people on earth. And that proves one thing above all others: It proves that whatever their defects, our government, our economic system, and our society are still the best that man has devised in 5,000 years of experimenting.

A few years ago, the Government of the United States made a survey of soil erosion throughout the country. It was the first time it had ever been done, and it disclosed an amazing situation. In less than two hundred years, America had lost one-third of its topsoil. At the time of the Revolutionary War, our topsoil averaged about nine inches in depth. In 1935, when the survey was made, the nine inches had shrunk to about six. One-third of our good soil was gone!

About 50 million acres of cropland had been so ruined by erosion that it could no longer be cultivated. That is as much cultivated land as there was in France before the present war—*more* than there was in Italy, or Germany, or Spain. Erosion had severely damaged over 230 million acres more of crop and grazing land. Most of the damage had taken place in the last two or three generations. Fields our grandfathers had planted were washed away. Where they had raised corn and wheat, we had gullies and ravines.

Now this was a matter that vitally affected not only the individual farmer here and there but the *entire nation*. Erosion was dealing body blows to our whole agricultural industry; indeed, to our whole national structure.

Here was a challenge to democratic government. There were people then who said we couldn't handle a problem like that by democratic means. Some said the government would have to force farmers to conserve their soil. Others said we couldn't stop erosion because every man had a right to use his land as he pleased, and if we interfered with that right, we would be killing democracy.

Most of us put no stock in that kind of talk. We knew a free people would meet this challenge as it has met others. So we pointed out to the farmers and ranchers of America the need for conservation of the soil, and showed them how they could stop their farms from going out from under them. We offered them the help they needed and asked them to do the job themselves. We didn't promise any rich rewards or threaten any punishment. We relied upon the sense of responsibility, the patriotism, and the ability of American farmers to do the job themselves, in their own way.

Well, in less than 5 years the farmers of America have gone into their polling places and voted to establish more than 530 soil-conservation districts. These self-governing bodies now embrace over 325 million acres of farm and ranch land. The farmers in these districts have given up none of their fundamental rights. On the contrary, they are *using* those rights to elect officers, vote on the adoption of programs, and conduct all the business of the soil con-

(Continued on p. 36)

SOIL CONSERVATION

CLAUDE R. WICKARD
Secretary of Agriculture

HUGH H. BENNETT
Chief, Soil Conservation Service

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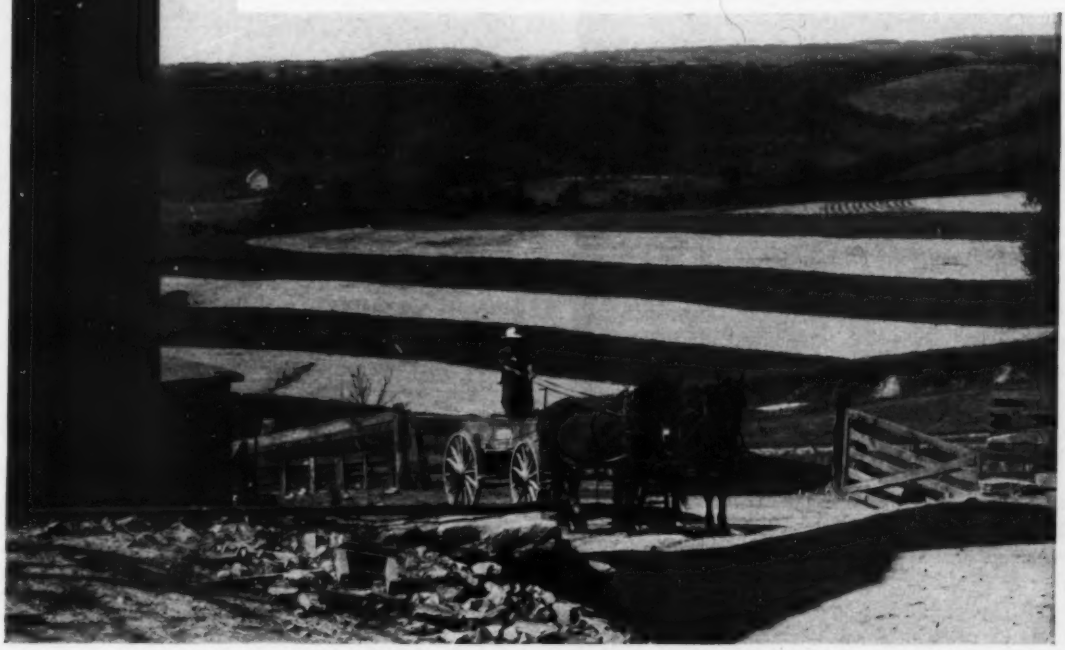
CONSERVATION AGAINST A HORIZON OF WAR

By F. E. CHARLES [1]

BECAUSE our work is in itself defense, we soil conservationists must do some straight thinking about our part in the defense program. Our work and our actions must be equally direct in conveying sound conservation principles to all persons who can do something tangible about conserving natural resources while simultaneously meeting extraordinary defense demands.

It may be accepted as fact that war is wasteful. Our own country, and the world as well, demands from us an all-out production. That kind of production is wasteful. There will be waste of materials—of

[1] Chief, regional division of information, Ohio Valley Region, Soil Conservation Service, Dayton, Ohio.



planes, of gun-powder, the ships we build; waste of labor, food cargoes, fuel oil, hospital supplies—countless items that have their origin in America's soil and water.

We feel sure that we can afford this waste to win the war and save democracy for ourselves and those other peoples who wish to avail themselves of democratic ways. There are, however, many conservation aspects of total defense. Will not the Nation look to conservation agencies for leadership in "conserving while wasting"—for a cause that is morally right?

It is significant that Canada, a nation at war, recently held, through the Canadian Conservation Association, its first annual national meeting for conservation.

"Conservation," said one of the principal speakers, "means wise use, not withdrawal from use. The attitude of the true conservationist is not that of a miser. Rather, it is an attitude that requires the application of imagination, skill, and courage to the management of our renewable natural resources, to the end that this generation may enjoy their benefits yet hand them on unimpaired to those who will come after us."

It was a forester, J. D. B. Harrison of the Dominion Forest Service, who pronounced that interpretation and found it acceptable to Canadian conservationists.

Along with us, our neighbors to the north believe they can use their natural resources and at the same time retain them. For example, they desperately need foreign exchange so that they may buy war materials of many kinds from other countries. The chief source of that foreign exchange in 1940 was forest products.

"Trade in all commodities other than wood, wood products, and paper, together with net exports of nonmonetary gold, yielded a favorable balance of 4 million dollars," Harrison explained. "But trade in the products of the forests and forest industries yielded a favorable balance of 310 million dollars."

This Canadian forester detailed the wasteful methods that have been, and in many ways still are, in use. "The present state of large tracts of Canadian forest lands is one of transition from an unmanaged to a managed condition," he concluded. "Problems remain . . . research is needed . . . before we can reach the goal of sustained yield . . . But progress is being made, and the future is not lacking in promise."

Our Canadian friend is giving us a splendid example of maximum use while maintaining the basic resource. Canadians know they can harvest timber crops and yet maintain forest cover. With proper fire control, the remaining forest cover also holds soil moisture, helps regulate stream flow which in turn facilitates operation of great hydroelectric plants.

What is the corollary to this in the United States? In many places, Indiana and Ohio for example, there is grave concern over lowering water tables. Better maintenance of farm woodlots, with annual harvests, would help to raise water tables. Thick pasture turf and luxuriant meadows, for grazing and hay crops, would produce more butter, pork, beef, and still hold more water and thus help to raise water tables and flow-levels in streams from which come industrial water supplies.

Contour cultivation will hold more water, grow larger yields on fewer acres, permit storage of reserve foods in other acres—and still guarantee adequate available foods. In the last war we plowed more and wasted much. Now, we will plow less, yet grow more.

CCC camps have provided one of our real assets in the fight to minimize soil waste. The camps also built strong bodies and developed minds. Thousands of CCC enrollees still work at soil and water conservation, while former enrollees have moved on to jobs in defense industries—another example of "using while conserving" for future needs.

These are conservation aspects of defense. Use and conserve.

The whole conservation program of the United States Department of Agriculture, numerous other Federal bureaus, State conservation departments, Friends of the Land, and so on, is one of defense. It has always been defense—defense against waste—conservation through frugal use.

We can go all-out for defense without being prodigal on the land. We can build factories and ships of wood and steel while on the land we maintain protective cover. We can send butter and lard and tomato juice to Britain—if we will hold the water and the soil; if we will add fertilizers, and use barnyard manures, and plow green-manure crops into the soil, and then take steps to retain unused portions of these fertilizing elements in the soil instead of allowing them to wash away; if farmers will remember that leaching and soil erosion remove many times as much of the plant nutrients from the soil as is removed through cropping and grazing, and if they will hold those unused nutrients in the soil.

The United States and Canada and all the other Americas can produce in abundance without impairing the supply of basic resources if they will avoid unnecessary waste. Democracies can defend themselves and be stronger afterward. We can arm ourselves by using the store of reserves we have kept in the soil. After this emergency we can begin hoarding again, in thrifty but not miserly fashion. Nearly a

quarter of a century passed after the last war before we realized that we were continuing the prodigality begun in the great conflict.

Referring again to the Canadians' conservation meeting, we find in the main address, by Dr. H. H. Bennett, still other conservation aspects for our defense program.

"Our efforts to conserve the soils and waters of America have produced two great and important contributions which will prove to be of immeasurable value to us now that the world is locked in war," the Chief of our Service declared.

"The first is the strengthening of democratic government and the faith of our people in that form of government through our success in meeting this test of our ability to govern ourselves. Once again we have solved our problems with the petition and ballot where others might have resorted to fire and the sword."

Farmer-organized soil conservation districts and AAA referenda on production control are good examples of "petition and ballot."

"The second contribution," Dr. Bennett continued, "is that our labors have made America more than ever *worth* defending. Our soils will be safe, our rivers and our forests will be safe regardless of the demands that war and reconstruction may put upon them. Never again, when circumstances force us suddenly to increase production of agricultural commodities, will we haphazardly and recklessly plow up plains country that will blow away, plow steep slopes that will wash away, or cut forests in such manner that generations cannot replace them."

It is important not to let the turbulence of war dim our perspective. Right now, winning the war for democracy is the Nation's first aim. Let there be no confusion on this point. We must defend ourselves at any cost. That we can and will do. And we will look beyond the ugly horizons of war. We are conservationists who, for near a decade now, have worked with the zeal of evangels, fighting fire and planning, the while, how to replace the burning structure. Here again the Chief of the Soil Conservation Service has cut the cloth for us:

"We must think beyond the conflict, too, of the ways and the wherewithal of progress. Then, as perhaps never before, we shall need to call upon our resources—*and they must not have been spent.* We have not always been so wise. In the chaos of the first World War, we robbed ourselves hysterically and needlessly. In the Great Plains of the United States alone, some 30,000,000 acres were damaged or ruined by wasteful use—a lesson we shall be wiser to remember than repeat.

"What profits it to spend enormous sums of money, to use up countless tons of irreplaceable resources, to sacrifice the lives of thousands of men, in defense of a Nation—if we let that Nation waste away?

"If it is worth an army to fight off an enemy that threatens our people with shells and torpedoes and bombs—that threatens our civilization—is it not worth a determined effort to combat the enemies that threaten our fields, our forests, our grasslands from which come our strength and security?"

The professional conservationist—and all who are conservationists at heart—will see that each conservation aspect of national defense means work for us. Let us not deceive ourselves—the job will be harder because of our total war effort; but if defense is urgent now, husbanding soil and water and forests is vital to our future.

We must work harder than ever before to make our people understand that America cannot well afford further destruction of the goodness of its earth. As an evangel, or an educator, a farm planner for soil conservation, an extension specialist, or whatever you prefer to call yourself, you can contribute to total national defense by believing and preaching conservation.

If you can reach and influence one person to save a little soil, a farm pond, or a useful bird or a tree, our total resources will be swelled by that much. Conservation, like other ideas and philosophies, is contagious. Soil conservation districts, for example, are like rolling snowballs, they grow bigger, cover more ground. The teaching of conservation in schools will bring results not even imagined as yet.

We must keep these things in mind and remember that the conservationist's defense job is rather well cut out for him. It would be a disaster if, in winning the war for democracy, this continent should lose all that it has gained, and more, in its battle for conservation. It would be a world tragedy if, in defending its borders, North America should lose the very resources—its soils and its waters—that make it strong.

Grass

We have as much reason for discriminating against corn-fed beef as we have for discriminating against grass-fed beef of the same degree of fatness or finish. Three years' tests of the carcasses of 60 steers fattened on bluegrass pasture and 60 steers fattened to the same degree on corn, cottonseed meal, and hay, showed that the grass-fed beef was as juicy and nutritious, and tasted just as good as the beef from the corn-fed steers. In fact, the judges could not tell the difference when they were eating the beef from the two different rations.—A. T. Semple.

LAND FOR DEFENSE NEEDS

By JAMES M. GRAY [1]

SINCE last September the Land Acquisition Division of the Service has mapped, appraised and optioned or prepared condemnation actions on approximately 345,300 acres of land for the War Department in connection with the National Defense Program.

This land will cost approximately $8,520,200. Additional land to the extent of 634,600 acres, costing $13,951,200 is to be acquired on these 27 projects. Personnel are now being organized to map, appraise, and secure abstracts of title on more than 1,500,000 acres of land for later purchase. This volume of work probably will continue for at least another year.

This contribution to the program of the War Department was made possible by former Secretary of Agriculture Wallace in response to a request from Secretary of War Stimson that the services of the Land Acquisition Division of the Soil Conservation Service be made available to him on a reimbursable basis.

The acquisition procedure established for acquiring land under title III of the Bankhead-Jones Farm Tenant Act is followed very closely, including the preparation of abstracts of title, perfecting title, and final closing and payment. The principal difference is the organization procedure. In our regular work, authority and supervision run from the Washington office through the regional office to the project. In our work for the War Department authority and supervision run directly from the Washington office to the project. This is because of the need to follow closely the procedures of the War Department and the more expeditious processing of the program.

At present operations are being carried out on 27 locations in 16 States. Four hundred and forty workers are employed exclusively in the program. This includes classifications from laborers to land appraisers.

A typical project organization is as follows: A project manager in general charge; a reviewing appraiser in charge of the work of other appraisers and negotiators; a cadastral engineer in charge of personnel doing surveys and mapping; a curative specialist in charge of title work and closings; and an administrative clerk in charge of the group doing the necessary clerical work.

Most recommendations on personnel actions, and vouchers for payrolls and expense, move directly to the Washington office of the Land Acquisition Division for approval for payment. The exceptions are those that are concerned with personnel detailed by the regional office to this work. The remarkably expeditious processing of these matters could not have been accomplished without the efficient and sympathetic cooperation of the Budget and Finance Division, the Personnel Management Division, and the Service Operations Division of the Service.

The authorization from the War Department to perform these services on a particular project carries with it a brief statement concerning the number of acres to be acquired and the amount of money available, and a map giving the approximate boundaries of the area. With this meager information the work of acquiring the land is initiated.

The first step, after establishing an office and securing the personnel, is to search the records as to ownerships in the area and prepare a description of the individual tracts as a guide in mapping, appraising, abstracting title, and optioning. Then the project rapidly takes shape and outside boundaries are established. This necessitates a tremendous amount of detailed work of clerks, engineers, draftsmen, and other technical personnel. Yet, with all this large volume of careful, detailed work and the tedious steps necessary in employing personnel, surprisingly rapid progress has been made. Since October 1, 1940, the average weekly encumbrance of land purchase money has been considerably more than $200,000.

A land acquisition program for purposes of national defense cannot be an entirely voluntary one. No matter how well trained and efficient are the appraisers, whose judgment forms the basis of negotiations for land, differences will arise with the owners as to prices to be paid. The appraisers being used are men trained and experienced in land appraisal in the general localities of the projects. They are well aware of the extraordinary conditions under which these purchases are made and are sympathetic toward the owners. They are also conscious of their sworn duty to perform honestly the trust placed in them through the Federal Government by the 130,000,000 citizens and taxpayers of the Nation.

If the owner and our negotiator agree on a price consistent with the appraisal value, an option to sell is secured and forwarded to Washington for acceptance by the Real Estate Branch of the War Department. This gives the War Department the right of

[1] Chief, land acquisition division, Soil Conservation Service, Washington, D. C.

possession at any time after the acceptance of the option. The War Department is most sympathetic and considerate in exercising this privilege by avoiding as much loss and inconvenience to the owner as is possible and consistent with the emergency needs for the property.

In instances where it is found impossible to arrive at an agreed price, supported by an option to sell, it becomes necessary to ask the Federal court to determine a fair value. The first step in this action is that those in charge of the project prepare a statement of ownership supported by an abstract of title and recommend court action to secure control of the land based on the appraisal price. This is forwarded to the Real Estate Branch of the Quartermaster General's Office of the War Department. A request is prepared by the Quartermaster General's Office to the Attorney General to institute condemnation action with a Declaration of Taking. Acting on this the Federal court is asked to determine ownership and to fix a fair price. The court appoints a commission of taxpayers to review the property and to fix a price. If this price is not satisfactory to either the owner or the Government, an appeal can be made for a jury trial. In the meantime, however, because of the Declaration of Taking attached to the condemnation action, the court can give the Federal Government possession of the land and the War Department can proceed with its use.

Members of the Soil Conservation Service, as well as other citizens, can be very helpful in this program, fraught with great economic and social disturbance factors, by making every effort to inform the public of the method of acquiring land for national defense purposes and to assure the people that the War Department desires to be as liberal as to prices, and as

A community makes its contribution to National Defense. Material ties, spiritual associations and home attachments are set aside in Caroline County, Va., as urgent needs arise for the army. Visual evidence of sacrifices entailed in the acquisition of lands for defense purposes is seen on this page—a church, a house, and a cooperative sweet potato association plant, all among properties now included in the A. P. Hill Military Reservation.

considerate in exercising possessory rights, as it is possible to be in conformity with laws and sound government business.

The lands being acquired will be used for various purposes, such as extension of present reservations, new training camps, maneuver grounds, air fields, antiaircraft training and firing centers, artillery and air bombing ranges, munition plant sites, and storage depots.

Just west of Savannah, Ga., 360,000 acres of land are being bought for Camp Stewart, an antiaircraft firing and training center. When this camp is completed there will be accommodations for 17,000 troops and a firing range of 17 miles radius on a 180-degree horizontal angle. It will be necessary to move from this area 1,500 to 2,000 families. Four consolidated white schools, 20 white churches, 10 negro schools, and 10 negro churches also must be removed. Several small villages will be completely removed as well as a considerable number of small community centers. Roads, telephone lines, and electric power lines will be discontinued.

This disturbance of peoples' lives, of civil governments and public institutions is the same at all locations. Its extent depends largely on the density of population and the development of public services and institutions. Not all disturbances are harmful. One owner of a telephone system, serving a small town and rural community, made a loud complaint because of loss of rural subscribers. When asked to make a financial statement of his losses he had to show that the increase in subscribers in the town, due to the Government establishing a permanent camp there, was three or more for every rural one lost.

The smallest area acquired thus far is 10 acres to be used as a site for a beacon light. The largest is a bombing range of 1,250,000 acres, just assigned to this Division for acquisition work.

While this Division has given considerable assistance in the problem of adjustment for the families to be evacuated, the Farm Security Administration is bearing the brunt of this tremendous undertaking. Other Bureaus in the Department of Agriculture also have rendered valuable services in this connection.

One of the most successful performances of this kind is now in full operation in Caroline County, Va., where approximately 80,000 acres are being acquired for maneuver grounds. Here, workers from Farm Security Administration, Agricultural Extension Service, Farm Credit Administration, State Department of Agriculture, and other National, State and local agencies under the general leadership of C. B. Lanford, County Farm Agent, have relocated 225 families in less than 2 months after work in acquiring land was started. This splendid accomplishment is the result of careful planning by the local representatives of these agencies and the farmers affected. This work in Caroline County is not an isolated case but represents what can and is being accomplished where these various agencies band themselves into an unselfish group to render the services each is best equipped to perform.

It is not amiss to pay tribute to the splendid spirit of sacrifice that is shown by the vast majority of the people who are having to leave their long-established homes. The War Department is as liberal in prices paid as is permissible under the laws governing land purchase by the Government, and is faithfully executing its trust to acquire and develop lands for national defense by the expenditure of the citizens' tax money.

Even so, those who are giving up their homes must bear many losses for which compensation cannot be provided in the land purchase. The losses, both monetary and sentimental, are being borne with a spirit of patriotism that marks these people as true sons and daughters of patriots, and sets an example for every individual and organization that is asked to take part in our National Defense Program. When the history of this period is written, these unsung thousands of rural heroes and heroines should be given a special tribute.

"LOOK AT AMERICA"

(*Continued from p.* 30)

servation program in their community. No one tells these farmers what they must do or how they must do it. No one has to—they do it themselves, because they *want* to. They have sought the assistance of specialists in the science of soil conservation to help them solve their problems. But they have *not* signed away any of their rights to manage their farms and their affairs.

And so I say it is pure, undiluted tommyrot to believe for one instant that good, old-fashioned, country-style democracy is weak and tottering. To anybody who weeps and moans about how the dictator system gets better results than our system, point to Grand Coulee Dam. Point to the Panama Canal, the Golden Gate Bridge, the Empire State Building. Point to our schools, our highways, and railroads. Point to the soil-conservation districts—as pure an example of democracy at work as there is in the world.

REHEARSAL FOR DEFENSE

By G. H. GILBERTSON [1]

EIGHT years ago, the CCC began making contributions to a national defense program that wasn't yet born. Recently, appraising these and more recent accomplishments, James J. McEntee, CCC Director, summarized the Corps' defense aims by declaring "We are continuing to do the conservation job we have been doing, but are intensifying and coordinating our program of training youth in national defense skills."

For young men in need of jobs times were tougher eight years ago than they are now. Tens of thousands of boys past school age, who had not yet found their niches in the world, were thrown into competition with experienced men for a handful of jobs.

Not content to witness the wasting of its human resources, the Nation created a new agency to utilize the energies of unemployed young men. It is appropriate that the task assigned youth was to help stop the wasting of natural resources so that future generations might still find them ample.

Today, the Nation can look forward to receiving a big return from its investment in youth—and sturdy, able young men are perhaps the most important of her defense assets. Since 1933, the CCC has returned to the country more than two and a half million young men of military age, physically more able and eager to defend the country that helped them weather difficult times.

Measure these 2,500,000 ex-CCC enrollees by a defense yardstick and the results may amaze you. Take the matter of health, for example—and then put yourself in the place of a CCC enrollee. Your diet may not have been up to par before you came to live at a camp, but the doctor in looking you over decides "Well, a little underweight, but otherwise fit for field work."

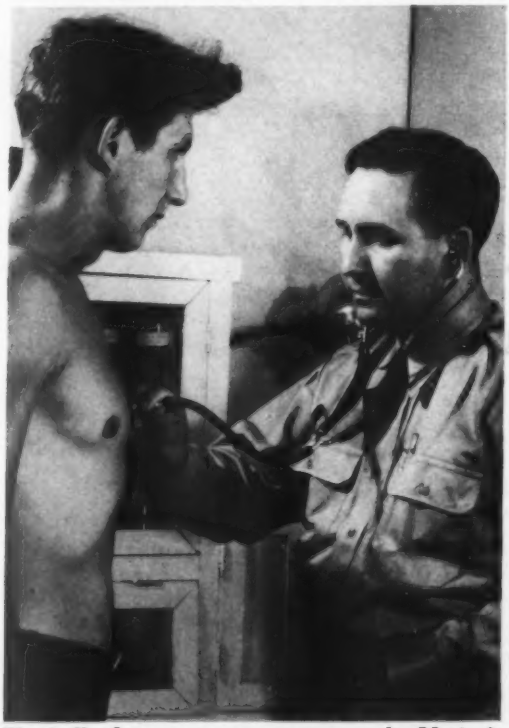
He then inoculates you against common communicable diseases, and after a toughening-up period you gradually find yourself able to swing a shovel or an ax all day without sore arm, back, and leg muscles. Before you realize it, outdoor exercise, regular sleep

[1] Information division, Soil Conservation Service, Washington, D. C.

This year the CCC has trained 60,000 operators of tractors, trucks and heavy equipment.

Retreat ends the work day.

and sound diets have built solid muscles, and soon the scale registers your gain in weight. Your teeth are put in shape by the dentist serving your own and neighboring camps. The camp doctor, who is always on hand, takes care of your illnesses and injuries, if you have any.



Physically fit young men are among the Nation's most valuable assets.

Six months or a year of this puts you in A–1 shape, or perhaps 1–A, as they say nowadays.

From the Army's standpoint, there is more to the CCC than the high health standards of its enrollees. Enrollees, you see, bridge part of the gap that distinguishes civilians from soldiers. During the World War days, the Army learned that most men who were suddenly wrested from their civilian jobs and sent to camps had to become acclimated gradually to Army life. In a way, this was a vexing, lost-motion problem. CCC enrollees become adjusted to group association during their stay in camps. They learn the meaning of, and the necessity for, personal hygiene and sanitation. They learn the give-and-takes that are necessary when the will of the individual conflicts with the way of the group. They learn discipline. In fact, in most of the curricula of the "school of the soldier" enrollees finish the primary grades.

Early in CCC history, the Army, looking ahead, found another value in the new organization: The 1,500 CCC camps proved to be excellent training grounds for reserve officers, and since 1933, 20,000 of them have obtained experience in handling men and supplies as CCC company commanders and subalterns.

Recently, since the beginning of the defense program, CCC companies have been assigned directly to

Soil conservation work lends itself particularly well to training surveyors and mappers.

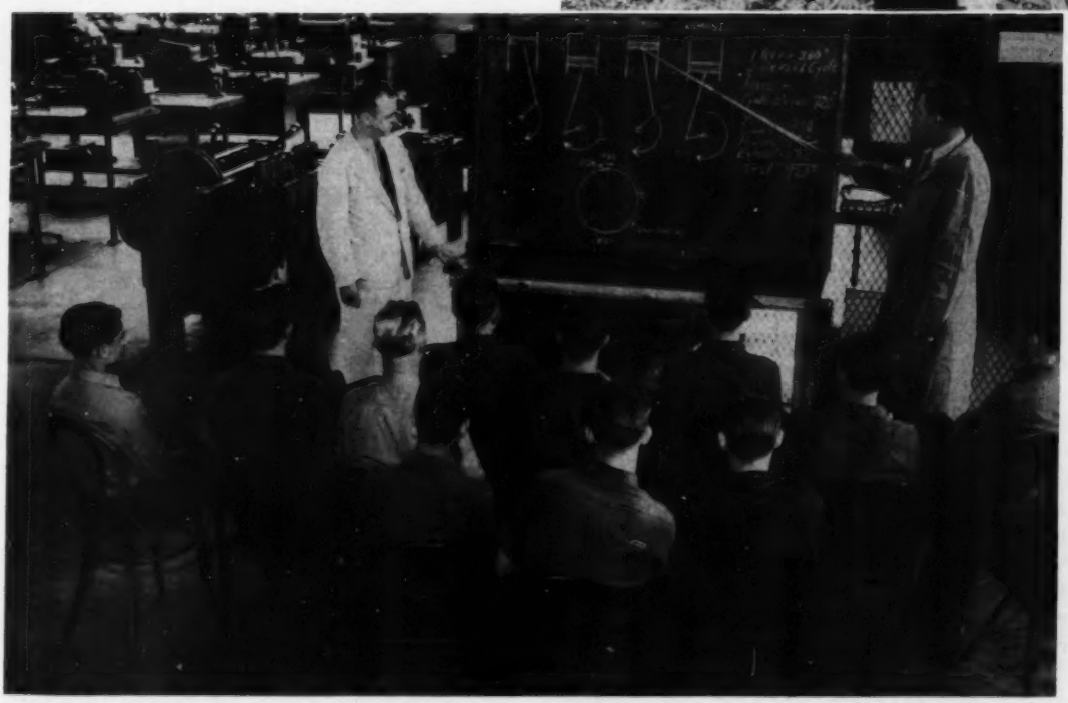
defense projects, to work at clearing land, building roads, developing drill fields, helping to construct airplane landing fields, and similar jobs needed in connection with the expanding military program.

No résumé of the CCC's part in the national preparedness program is complete without mention of its role as a training organization. In fact, training is a function of the CCC made mandatory by its enabling act. From the beginning the CCC has been a work-and-learn agency.

In this day of a possible future scarcity of trained men, the roll call of the CCC training program is sweet music to many ears. Not all enrollees have become expert craftsmen, to be sure, but a good many are prepared at least to fill the gaps as men with more experience and greater ability are needed elsewhere.

Save for supervisory positions, enrolless do all of the jobs required to operate and carry on the work program of a 200-man camp. Enrollees are cooks, trained by the Army at special schools for cooks, bakers, and mess stewards. Enrollees are clerks, draftsmen, mappers, warehousemen, mechanics, blacksmiths, truck and tractor drivers, bulldozer and drag-

(*Continued on p. 43*)



J. J. McEntee, CCC director, visits an auto mechanics class at the central repair shop at Salem, Va. (Standing, at left.)

FITTING LAND UTILIZATION TO NATIONAL DEFENSE

By WILLIAM R. NOBLE [1]

LANDS held under title III of the Bankhead-Jones Farm Tenant Act were acquired by the United States to effect a land-use adjustment by removing worn-out and misused lands from private ownership. The objective was to restore the lands by using them for a purpose to which they were better adapted, to relocate families occupying the land purchased, and to rehabilitate families permitted to remain in the area of adjustment.

The acquisition of land, relocation of families, and development and improvement of the land constitute the first step in the program of land-use adjustment. The completion and effectiveness of the job depends on the program of land management.

At the time a project is initiated, rather definite determinations are made regarding the future use of the land. Plans are directed toward the most intensive use that will be consistent with restoration and conservation of the land, practical from the standpoint of the expenditure required for development, and which will best serve the needs of the community by providing a basis for a better standard of living. The primary uses include grazing or pasture, forestry, recreation, and wildlife conservation.

When the land-utilization program was started it was recognized that many areas would be acquired which were well suited and strategically located for military use. With this in mind, the projects established were from time to time listed with the War Department to provide that Department with preliminary information concerning the nature and location of our areas for consideration in the event of a national emergency.

Early in 1937, War Department officials indicated an interest in securing the use of lands being acquired in close proximity to military reservations. It was agreed that, after the relocation of families and the development and restoration of the land was completed, favorable consideration would be given to these requests. Accordingly, in 1939 the Plattsburg and Pine Camp projects in New York, totaling 13,823 acres, and the Camp McCoy project in Wisconsin, totaling 9,448 acres, were transferred to the War Department and reserved for use in connection with existing military reservations.

The families living on the lands purchased were all removed to other locations where they would be able to make a better living. The lands which were primarily unsuited to cultivation were developed to control increasing soil erosion by the building of dams and by restoring the protective cover. Trees, grass, and wildlife-cover plantations were established and certain minor recreational facilities were provided. Appropriate areas were cleared to serve the needs of the War Department. War Department officials agreed to continue the program of conservation of the soil resources and to protect the forest and wildlife resources insofar as consistent with military use. Officials of the Soil Conservation Service will no doubt be called upon from time to time for advice and assistance in this respect.

With the development of the world crisis and an increasing emphasis on the program of National Defense, officials of the Soil Conservation Service have found it necessary and desirable to cooperate closely with officials of the War and Navy Departments to fit the program of land utilization with that of National Defense. As we have been advised by those Departments as to the sections of the country in which lands were needed for camp sites, ranges, storehouses, airports, and maneuver areas, our projects have been reexamined in an effort to assist in filling those needs with least interference with our program. The examples given below will indicate the progress that has been made to achieve this purpose.

Early in 1939, War Department officials advised that an area of approximately 1,000 acres in eastern Oklahoma was needed for a rifle range. A survey was made of the Cookson Hills project in eastern Oklahoma to determine whether an area could be located which was secluded from private land holdings and was not well suited for such uses as pasture, foresty or wildlife. Such an area was located and reserved, and it is now being used by the War Department as a rifle range. This use is causing very little interference with the pasture, recreation and wildlife uses of the remainder of the project.

Early this year, War Department officials advised that several sites of approximately 600 acres were needed in northwest Louisiana as aerial bombing ranges. A survey of our northwest Louisiana project revealed that several sites could be located which were removed from private holdings and had not been made available for public use. One such area of 600

[1] Land management division, Soil Conservation Service, Washington, D. C.

acres was reserved for use by the War Department in April of this year. It is likely that one or two additional sites can be used for the same purpose without seriously impeding our program in this area which involves forestry, pasture use, recreational use and wildlife conservation. Any areas selected will, of course, have to be remote from areas subject to intensive public use.

Upon request of the War Department the Lakeland Flatwoods project in Georgia, involving approximately 8,720 acres, has been reserved for use by that Department as an aerial gunnery range. The area has a large site suitable for the landing of planes. The lands acquired are in a solid block and all families have moved to other locations. The lands were acquired primarily for the purpose of determining conservation measures that might be applied to this area to make it suitable for dairy and beef cattle production. Upon the expiration of the emergency this area, as well as those in Louisiana referred to above, will be returned to the Soil Conservation Service for a continuation of the land conservation program as originally planned.

At the request of the Navy Department, a portion of the White River project in Indiana was recently reserved for use as a site for ammunition warehouses. This project had been placed under management of the Indiana State Conservation Department, primarily for forestry uses, with the Forest Service designated as custodian. The Soil Conservation Service cooperated with the Forest Service in securing approval of the State to the reservation of a portion of the area for exclusive use by the Navy Department. The State will continue to manage the remainder of the project as originally proposed.

A few months ago the State Armory Commission of Alabama was authorized to use for an initial period of 5 years the Pea River project in Alabama. The project is being managed by the Alabama State Commission of Forestry under agreement with the Department of Agriculture, primarily for forestry, recreation and wildlife purposes. The Soil Conservation Service is the custodial agency to assist the State in this program. The management program of the State Forestry Commission is to continue, but the Armory Commission is authorized to use the area from time to time as a camp site and maneuver area for the National Guard. National Guard troops will be given equal privileges in the use of recreational facilities such as are afforded to the general public. It is not contemplated that this arrangement will interfere to any considerable extent with the land-utilization program being carried out.

From time to time, sites have been made available to various Federal and State agencies for airway beacons, monitoring stations, temporary maneuver and camp sites, and emergency airplane landing fields. At present, consideration is being given to making available to the Southern Illinois Normal University an area of approximately 1,200 acres in the Crab Orchard project for use as an airport for student pilot training. The university is conducting its training program in cooperation with the Civil Aeronautics Administration and will be governed by the requirements of that agency in the use of the airport. When the need for this use of the land no longer exists, the land will revert to the United States.

Requests have been received from the War Department and the Navy Department for sites to be used for national defense purposes in various parts of the United States. Immediate consideration is being given to these requests to determine whether or not suitable sites are available within Land Utilization projects.

Although military use is not entirely consistent with the purposes for which title III lands were acquired, in many instances it is the highest use to which the lands can be put, especially during the present national emergency. It is recognized that military use will in most cases interfere to some extent with the land-utilization and conservation program. On the other hand, such interference may be offset in some instances by benefit to local people as a result of employment afforded them by such use of the lands.

It is intended that in carrying out the land utilization program the Soil Conservation Service will serve to the fullest extent the needs of the National Defense Program, and at the same time will attain the objectives for which the lands held under title III of the Bankhead-Jones Act were acquired. Requests of the War and Navy Departments will continue to receive priority, but an effort will be made to serve the needs of those Departments with least interference to the program of land utilization and soil conservation.

LAND AND PEOPLE

Out of the logbook of the Chief of the Soil Conservation Service come intimate notes of activities on the soil-defence front, in the form of an engrossing article titled "Land and People" tabbed for publication in the September issue.

"A TRIUMPH OF COMMON SENSE"

Often reiterated in these fluid days are questions regarding the compatibility of defense production with soil conservation. Will there be another plow-up program? Must we set aside all plans for the permanent husbanding of agricultural resources because of urgent immediate needs? Elsewhere in this magazine is an article by F. E. Charles which meets the issue squarely and should do much to clarify the thinking of troubled minds. And from far away Harpenden, England, comes a sane statement, in long perspective, reflective of a similar trend of opinion: a short article in Soils and Fertilizers, published by the Imperial Bureau of Soil Science under the title, "War's Opportunity." This statement is reproduced herewith.—*The Editor.*

THE last war immensely accelerated the process of land exploitation that had been gathering momentum over most of the world for some decades previously. In the United States, in particular, huge areas of virgin prairie land were ploughed up and bled to the bone in order to satisfy the unprecedented demand for food that came from hungry and battered Europe. Much the same thing happened in other countries. During and after the war production was all that mattered, and land deteriorated rapidly until erosion became ubiquitous. Subsequently strenuous efforts were made to stem the swelling tide of erosion, and within the last few years it has seemed as though, taking the world as a whole, the lessons of erosion had been learnt and agricultural systems were being slowly evolved which, instead of exhausting the soil, would gradually build up fertility and stabilize the land. The story has been told again and again. Its first chapters were dismal, but the last recorded chapter promised to lead on to the greatest of all man's triumphs over Nature. Will that chapter be closed by the present war? Shall we again embark on a policy of reckless production to satisfy insistent present needs, undoing the good work of the last few years, exposing the soil once again to the ravages of its most dangerous enemy?

It may be taken for granted that present, war-time demands on the land will, if humanly possible, be satisfied regardless of the cost to the future, and that if the world is hungry after the war every effort will be made to satisfy its hunger, again regardless of the cost. But this need not result in another world-wide deterioration of land; on the contrary, there is every reason why the war should give an added stimulus to the conservation movement. The last war accentuated an already existing trend towards exploitation; this war should likewise accentuate the recently established trend towards conservation. President Roosevelt is reported to have stated that a ploughing-up programme will not again be countenanced in the United States. Although it would probably be beyond any man's competence to prevent a repetition of what happened after the last war should similar post-war conditions return, the President's statement may be taken to express the American people's fear that their successful conservation work may, and their determination that it shall not, be brought to nothing. The fear seems groundless for several reasons—for example, the post-war situation which agricultural exporting countries envisage and are already taking tentative steps to meet is not an insatiable demand for new produce at irresistible prices, but an unwanted accumulation of grain surpluses which could not be exported during the war. Apart from the discredited method of destroying surpluses the problem would best be tackled by accelerating the change-over which has already been initiated from extensive cereal culture to soil-conserving crops. Add to this the obvious intention of Great Britain and (presumably) other European countries to develop agricultural self-sufficiency to the utmost, and it will be seen that in the United States and the British Dominions present conditions are, and future conditions probably will be, remarkably favorable for the execution of sound soil-conservation policies.

An analogous state of affairs exists in the tropical dependencies of the British Empire, although perhaps the natural assumption that war must restrict peace-time programmes of social reform has dimmed recognition of the immense possibilities opened up by war conditions of getting an agricultural basis for soil conservation firmly and permanently established. It is unlikely that many unwieldy surpluses of tropical produce will accumulate, nevertheless, owing to the severe contraction of trade with Europe, it is becoming imperative for tropical countries to attain a greater degree of self-sufficiency in foodstuffs than has been necessary hitherto. This in itself is encouraging the development of self-contained agriculture which, as numerous examples in both tropical and temperate regions have proved, can be made very conservative of soil fertility. So long as cash crops for export can procure from abroad not only sufficient food, but also

some of the amenities of a more advanced culture it is natural that any movement towards a more self-contained agriculture should be strongly resisted—at least when it approaches a point that satisfies the minimum requirements of the soil for conservation. Beyond that point it is almost impossible to advance against the opposition of economic forces, but opposition breaks down in face of a threat of hunger. More home-produced food at any sacrifice then becomes the order of the day, and an agricultural revolution can be carried through on a scale that would be impracticable under "normal conditions."

Obviously, an intensification of indigenous food production can be made the occasion for exhausting the soil, but in most circumstances the development of a more self-contained agriculture can and should go hand in hand with the parallel development of a sound conservation policy. The one should help the other. A short-term programme, put into operation with the intention of abandoning it when the emergency has passed, might well do more harm than good to the soil, but a long-term programme must by its very nature depend on the building-up of soil fertility, and therefore on soil conservation. In general those conservation measures, both technical and social, which have proved their worth, if not their applicability, in the tropics can be adapted with advantage to the task of attaining greater and lasting agricultural self-sufficiency. They will become more easily applicable if the people learn that they must rely for their day-to-day existence on the continuing fertility of their land; but to achieve their secondary purpose of stabilizing a largely self-contained agricultural system as well as their primary purpose of conserving the soil they must be coordinated as part of a planned and, under the exigencies of war, unavoidable agricultural revolution. How far that revolution must go in any particular country, or whether it is ultimately desirable on economic grounds, we cannot say, but socially it can be made beneficial if it is based upon a forward soil-conservation policy. The need for more self-contained agriculture in war time is universally recognized. The desirability—at all times—of its natural complement, a comprehensive soil-conservation policy, is also widely recognized, although nowhere in the colonies has such a policy become a reality, largely because of the difficulties of effecting just that kind of agricultural revolution which the war is making inevitable. It would be a tragedy if, in planning to meet the war-time problem of a threatened food shortage, the all-time problem of soil conservation were lost sight of. It will be a trimph of common sense if each is made to solve the other.

REHEARSAL FOR DEFENSE

(*Continued from p. 39*)

line operators, axmen, sawyers, rough carpenters, quarry workers, and construction workmen.

Some are leaders and assistant leaders, exercising limited authority by virtue of their proved ability. Others are specialists, able to run accurate survey lines, or to do plane-table mapping. They have learned their jobs under the watchful eye of technicians and foremen who, because they realize they are helping to mold careers, are exacting and thorough.

Since the defense program began, the CCC has revamped its training objectives with all-out preparedness in mind. In cooperation with Federal and State vocational authorities, new avenues of useful training have been opened to enrollees. Today CCC men sit shoulder to shoulder with thousands of other young men who attend evening vocational classes to learn defense skills.

With the help of vocational authorities the CCC has also established special programs of defense value. One, at the Vista, Calif., soil conservation CCC camp, has been in operation for more than a year. The course is in aviation mechanics, and its purpose is to develop men who can help fill the needs of aircraft industries engaged in the production of defense materials. A competent instructor is furnished by the Escondido high school. Interested aircraft manufacturing concerns donated materials. By attending classes during three months' leisure time, enrollees learn the routine and tools used in aircraft assembly. Proof of the value of the course is attested by the willingness of one manufacturer to employ all the enrollees who complete the course. Already more than 200 enrollees have been "graduated" and are now employed by aircraft industries.

In terms of work accomplishments, the CCC has done and is doing a big job. The work of enrollees has increased the natural wealth of the land by hundreds of millions of dollars. The sweat of the CCC has made the United States a better place to live in, a country more worth protecting and defending and, in terms of reserve resources and reserve man power, a Nation more able to protect and defend itself.

Surveyors with special knowledge of the requirements of aerial field control, plan and execute the work. They must be capable of computing regular traverse and triangulation work.

In the SCS photographic laboratory a trained group of men is engaged in the inspection of aerial negatives, the printing, rectification, and enlargement of photographs from films, and the compilation of mosaics.

CARTOGRAPHIC DIVISION AND NATIONAL DEFENSE

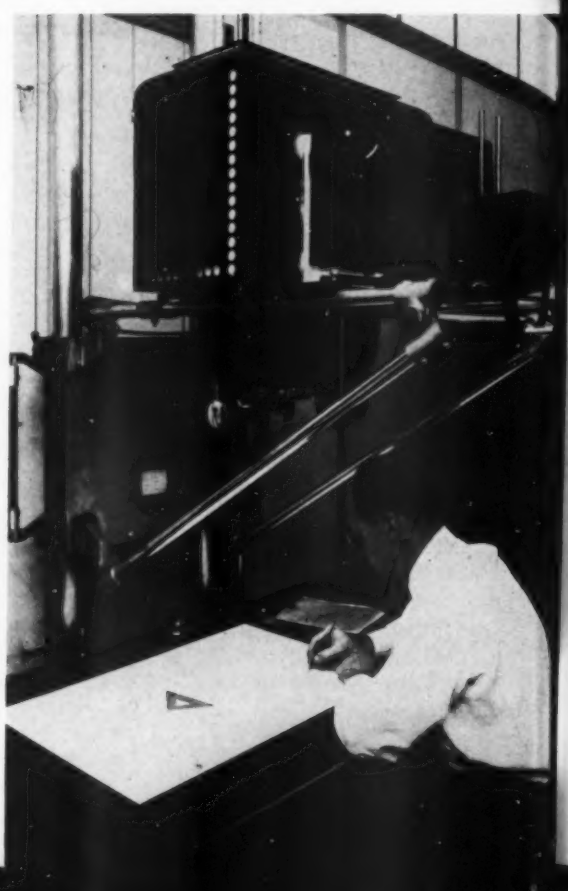
By HARRY T. KELSH [1]

THE Cartographic Division of the Soil Conservation Service takes pride in the fact that it has developed, in its general map work, the fastest system for making maps of good accuracy from aerial photographs that is as yet available. The speed of production has been made possible by the development within the Division of the "slotted templet" system for extension of radial control. In a very few words, this system creates graphically, upon a desired grid, or map base, with very little ground control, an accurate network of actual positions of identified points on the photographs, to which the detail of the photographs can then be correctly applied.

The system described above may be particularly beneficial under war conditions where usually only a small amount of initial ground control is available. Its value and work of the Cartographic Division with this system are well recognized by the War Department and other mapping agencies. At the present time the Hydrographic Office is ordering a duplicate of the apparatus developed here for cutting slotted templets.

The method of securing the necessary control points for map making is not the only development of the Cartographic Division. The map detail must still be drawn in, and in this connection the Division was materially responsible for the development of the overhead projector for this work. The photograph is placed in this projector and the image is projected upon a plotting sheet below. The machine, by suitable manipulation, brings the image into desired position and size. At present twelve of these projectors are in operation here, and we have recently added a complete multiplex unit to our equipment.

With the control established, the detail is transferred from the photographs by men trained in recognizing essential map information.



[1] Head, map control section, division of cartography, Soil Conservation Service, Washington, D. C.

The office routine by which the photographs or templets representing them are placed in correct map position has called for a new system of map control. Due to the simplicity of the method developed here, it is especially applicable to the defense program.

Names, culture, and other data are rapidly placed on the map by mechanical processes.

A number of maps of small areas already have been called for to meet Defense needs. The most important thus far turned out is for an experimental laboratory site adjacent to the Cleveland airport.

It has been said that while the Department of Agriculture is the largest governmental user of maps, the agency as a whole has not been map-minded. Until comparatively recently the Department was willing to take whatever was available in the form of published maps and make them fit the needs as well as possible. With the establishment of the Soil Conservation Service, and our need for large-scale maps upon which detailed agricultural studies could be surcharged, it was found that in most instances it was no longer possible to use the published maps of agricultural areas. The Cartographic Division was organized to meet this need. To many in the Department it is still difficult to realize that in the last 6 years a mapping organization has quietly grown up in the Soil Conservation Service that is today one of the most up-to-date in all the Government bureaus and is recognized as such by the other map-making organizations.

This Division came into existence after it had become clear that mapping by use of aerial photographs was rapidly superseding all other methods. Because of this, only the latest form of equipment for use in this work has been purchased and much equipment in this specialized field has been developed within the Cartographic Division. The Divisional headquarters at Beltsville is set up to render a complete mapping service, from original planning to final printed reproduction. The photographic laboratory ranks well with any in the country. It is equipped to turn out as many as 40,000 photographs per month, and to do precision enlargement work up to a camera capacity of 26″ x 36″.

This part of the Division is also equipped to make either controlled or uncontrolled mosaics from the individual photographs. This work is highly technical and specialized, requiring a knowledge far beyond the requirements of ordinary photography, since the photographs must be matched for general tone and each individual print trimmed and applied to the

(*Continued on p. 58*)

The finished manuscript map is transferred to the photographic laboratory and there, through the use of photolithographic methods, is transformed into a printed map.

THE PERPLEXING CASE OF INDIAN CORN

A modern planting of Indian corn in Arizona.

By WILLIAM R. VAN DERSAL [1]

FROM Canada to Patagonia corn was being grown by American aborigines when European civilization "discovered" it. Northern Indians used it and showed early colonists how to grow it in hills, each with a fish for fertilizer. The Mound Builders had it, and the more ancient Incas, Aztecs, and Mayans depended heavily upon the plant for their food. Corn of today indeed is not much different from the plant found by Columbus. Our well bred varieties display greater uniformity, we have developed superior dent varieties, and we have discovered ways to produce high-yielding hybrid corn, but to the Amerindian belongs the credit for developing the plant from its wild ancestors, and for bringing it to an extremely high degree of productivity (*6*).

In many parts of America the growing of corn has come to mean almost the same thing as farming. Parts of 11 States, from Ohio west to Nebraska and South Dakota, comprise the familiar Corn Belt of the present day, although in 1840 the belt of greatest production lay across Kentucky, Tennessee, and Virginia (*2*). We think of the deep South as cotton country, yet Georgia and Alabama had an average of 27 percent more land in corn than in cotton during 1928–37. In the same period Georgia alone had an average of 10 percent more land in corn than Ohio—one of the Corn Belt States. In fact, in the most remote localities corn is commonly found occupying the greater part of the acreage devoted to crops, if it can be grown at all. Actually corn is grown in every State in the Union—only a few thousand acres of it in Nevada to be sure, lowest of all States—with altogether about 2,500,000,000 bushels from some 90,000,000 acres for the entire country. The United States, in fact, usually produces well over half the entire world supply.[2]

Consumed directly or in the form of meat and other animal or processed products, corn is a principal source of food for the American people. The grain is very nutritious, as it contains a high percentage of easily digestible carbohydrates, fats, and proteins. Corn may reach the table as cornbread, hominy, corn pudding, an alcoholic beverage, or "on the cob." It may be poured on corn scrapple in the form of sirup, sprinkled on fruit as sugar. or put on salad as the oil base in the mayonnaise, The crust on bread may have been painted with corn dextrin to give it its soft brown color, and ice cream, candy, and even chewing gum manufactured from corn products may conclude many an American dinner. Some figures on this score are of interest. From corn we produced in 1939 [3] approximately:

[1] The author, who is senior biologist, Soil Conservation Service, Washington D. C., gratefully acknowledges information supplied by M. T. Jenkins of the Bureau of Plant Industry, as well as the helpful suggestions and criticisms of T. D. Johnson, A. T. Semple, E. H. Reed, and Edward H. Graham, of the Soil Conservation Service.

[2] Figures from Agricultural Statistics, 1940. U. S. Department of Agriculture.

[3] Figures collected by the U. S. Bureau of the Census in 1940, rounded off to the nearest hundred thousand.

A crop of corn is maturing somewhere in the world every month of the year. This Nebraska field is unsafely used for corn, as the poor plants in the left foreground plainly show.

1,120,300,000 pounds of cornstarch worth	$29,300,000
467,100,000 pounds of corn sugar worth	13,600,000
957,300,000 pounds of corn sirup worth	21,100,000
106,500,000 pounds of corn dextrins worth	3,500,000
65,100,000 pounds of corn oil, oil cake and meal worth	584,000

It is estimated that in the United States we eat about 16 bushels per person each year in one form or another, although it is the indirect route that most corn follows to become food for man. Between 5 and 6 pounds of corn fed to hogs will make a pound of pork, for example. The great corn-hog agriculture with all its complex economic interrelationships comes about because the hog is used as the principal direct consumer of corn. Indeed, the pork industry of the United States depends almost entirely on corn, using about 40 percent of the total crop raised. But many domestic animals other than cattle and pigs are fed on corn, and corn is fed in other ways than as grain. The practices of fermenting green corn in silos and of feeding stock on stover—the cornstalks after the ears are removed in the field—are well known to every farm boy.

An interesting sidelight on the esteem in which corn is held as a food is provided by its wildlife record. According to the files of the Fish and Wildlife Service, more kinds of wild birds and mammals feed on corn than on any other herbaceous plant, including even wheat and alfalfa, both of which are widely used by wildlife as food. In fact, 140 kinds of wildlife are recorded as utilizing corn in their diets. The animals are noted on the back cover of this issue, and of course the competition between crows, blackbirds, and man for the corn crop is well known.

During recent times immense reserves of corn have been accumulated in this country. The total quantity on hand on April 1 of this year amounted to 1,423,000,000 bushels, about 16 percent of which

Maize was the basic food plant wherever Indians practiced agriculture in America. Here corn is ground in a bin at the summer hogan of an Arizona Indian.

The practice of planting corn up and down hill instead of on the contour makes corn as well as other clean-tilled plants dangerous crops. A slight shift to align these corn rows with the terrace would have saved large quantities of soil.

was owned by the Government, 21 percent was under loan, and the remaining 63 percent classed as "free corn," that is, in private hands without a loan. Last crop season's carry-over amounted to 695 million bushels, and present indications are that next year's will be somewhat larger—possibly to the extent of 50 million additional bushels.[4]

So far we have considered corn in an entirely favorable light, just as most farmers always have. The plant forms the basis for a major agricultural endeavor, provides tremendous quantities of food for man and his livestock to say nothing of wildlife, and is of great commercial importance both for itself, for stock feed, and for the derivative products manufactured from it. Scarcely more than 10 years ago, however, some facts began obtruding into this picture that threw an unexpectedly sinister light on the use of corn.

In reality the first of these unpleasant facts was apparent many years ago. Then we became aware of the fact that the annual average yields of corn for the 63 years preceding 1929 look about the same as the average for 1920 to 1929. The hidden significance here is that yields should have increased, because corn varieties were improving steadily just as methods of farming were generally becoming more efficient and economical. But corn yields did not increase. In other words, soil productivity declined so greatly as to offset otherwise substantial gains made by plant breeders and progressive agriculturists. In addition, corn has been grown in many regions on extensive areas of poorer soils on which yields are lower, and this of course also tends to depress average annual yields per acre.

The second set of facts came out of studies made at many experiment stations on soil losses under different crops and cropping systems. It was discovered—and this has been repeatedly confirmed since—that clean-tilled plants such as corn and cotton, farmed under old and long-established systems, induce more erosion than any other types of crops. The trouble was not with the plants themselves; corn, for example, is not inherently bad even though its water and nutrient requirements are high. The fault lay with the way corn was being grown. When corn is planted and cultivated up and down hill, when it is used continuously on the same land, when it is planted on steeper slopes, when no cover crops are used with it, and when it is harvested without a cover crop following it, then serious soil losses must be expected. Under such conditions we now know that corn is an unsafe, not to say an undesirable crop.

[4] Figures and estimate from Feed Situation for April 1941, issued by the Bureau of Agricultural Economics.

Corn under patch farming planted "with a shotgun" according to the farmer. Slopes like these belong in permanent cover. If there is any cornland in this picture, it is in the center on the valley floor.

More recently another unpleasant situation has developed with respect to corn as well as to a number of other agricultural commodities. Briefly put, the volume of agricultural exports from the United States has shown a steady decline. Considering the average for 1909 to 1913 as a standard, the average volume of such exports for 1934 to 1937 dropped to 57 percent of what it formerly was. In July to September of 1939 it was 58 percent, and by July to September of 1940 it had fallen off to only 28 percent of the earlier "par" figure (*3*). The war in Europe with all its related effects has caused a virtual disappearance of our foreign markets, as one writer puts it, and corn has suffered along with the rest of our exports (*3*).

Hitler's conquests in May and June 1940, and the increasing effectiveness of the British blockade, closed the European market for our farm products (*10*). Not a single bushel of corn, for example, has gone to Germany, Denmark, Norway, Belgium, France, and some other countries since October of 1940.[5] Furthermore, predictions are being freely made at present (*8*) to the effect that when peace finally comes, the United States never again will find as large an export for its farm products as in the 1920's. In that event a major readjustment appears inevitable.

We are now in a position to consider what may happen to corn in the light of its great value as food, the harm wrought to soil by unsafe methods of its culture, the surpluses of corn available and expected, and the fact that corn and corn-equivalent exports have declined so greatly. As we do so we need to bear in mind that corn is a food in which the Nation is vitally interested, not only in the present defense emergency and in case of war, but also in peacetime.

The defense effort of the United States has brought sharply into focus the need not only for food in quantity but for the right kind of food. Recently, R. L. Mighell put the matter pungently when he said:

> The most serious adjustment problem for this middle-term war period . . . comes down to a matter of producing additional quantities of certain foods needed to further the war effort . . . producing these in the regions and areas where they can be obtained most efficiently and with the least troublesome after-effects (*8*).

Now while corn is an excellent food, it is essen-

[5] Figures from the Office of Foreign Agricultural Relations, U. S. Department of Agriculture, as of March 31, 1941.

tially a carbohydrate and therefore only contributes to a balanced diet; thus it cannot be relied upon as the sole article of food. This is one of the many reasons why, in the face of enormous reserves of corn as well as wheat, the Department of Agriculture has asked farmers to raise more foods of high protein and vitamin content. To assure farmers of adequate markets and to provide supplies for defense purposes, price supports have been placed under hogs, the direct consumer of corn, and several other products; but there are no such guarantees for corn itself. This, it is hoped, will result in conversion of reserve foods such as corn of which we have too much, to foods such as pork of which we are in great need. In the meantime the crop-acreage control program of the Agricultural Adjustment Administration, designed to reduce acreages of corn, oats, and other erosion-inducing crops and to increase the amount of land devoted to grass and hay, has tended to reduce corn acreage. Coincident with work of the AAA, the Soil Conservation Service and soil conservation districts, in driving forward on a program of proper land use, have been actively engaged in taking corn and other clean-tilled crops from unsafe slopes and converting such land to permanent cover useful for hay, pasture, woodlands, or wildlife. This does not always or necessarily reduce corn acreage, but in many sections the tendency is in this direction.

There is no doubt that Federal agricultural action programs such as these are resulting in substantial reductions in land devoted to corn, as compared to permanent cover crops. Corn acreage in the 6 central Corn Belt States dropped to 32 million acres in 1940 compared to the 39 million average for 1928–32—a drop of 19 percent—according to a recent study (*11*). Not all of this cut should be ascribed to Federal programs, since drought conditions have operated very forcefully also. That such reductions in acreage are likely to continue seems clear since the soil conservation movement is gaining increased momentum daily. Eric Englund of the Bureau of Agricultural Economics declares that "unless the war and the defense effort should absorb public interest and resources to such an extent in the next few years as to preclude for a time full continuation of the land use and conservation programs already under way, it is probable that these programs will go forward, as the basic reasons for them will remain" (*3*).

Having taken due note of at least some of the more important factors operating to decrease the amount of land devoted to corn, we may turn our attention finally to the possible ways in which such an important food can be handled without soil wastage. In doing so we must keep in mind the disastrous effects of our agricultural mistakes of the last war when erosion was needlessly initiated on so many thousands of acres that should never have been plowed. There are three possible ways to deal with corn:

1. Soil-conserving practices can be applied wherever corn or other clean-tilled crops are grown. For corn these include a rotation system under which the land is exposed to erosion only a small part of the time; contour farming, with small furrows and ridges left by implements, either alone or in combination with terraces, acting to hold water; strip-cropping, whereby any run-off of water resulting from a break in contour checks is interrupted in its downhill rush by a strip of close-growing vegetation; cover cropping, to protect the soil from washing during the season when corn is off the land; and stubble mulching, whereby the cornstalks are left to help prevent soil blowing, to hold snow, and to minimize soil washing (*9*). These practices, adapted to soils and conditions as local variations require, can make it safe to grow corn. But, especially in view of the defense emergency or in case of war itself, these practices to be effective must be widely applied.

2. Proper land use combined with the use of the new, high-yielding, hybrid corn can be made to result in corn yields sufficiently great to offset considerable reductions in corn acreage. For example, class-1 land, i.e., land on which eorsion-promoting crops can be grown without danger of appreciable accelerated erosion, must be the land used to grow corn if soil destruction is to be prevented.

At the same time, in view of increases in yields up to 35 percent from hybrid corn (*4*), such superior types can be expected to concentrate production on the smaller acreages of the best land. A large number of hybrid corn varieties have been released for commercial production, and although those adapted to the Corn Belt are in the lead, hybrids for other parts of the country, including the South, are rapidly coming into use. More than 25 percent of the national acreage is now in hybrid corn, and in some Corn Belt States nearly 90 percent of

Corn safely used on gentle slopes in Illinois. It is on the contour, in a good rotation including a year of red clover, and in alternating strips with timothy-alfalfa.

the corn acreage is devoted to the hybrid varieties. It is worth noting that in concentrating hybrid corn on class-1 land, the least productive acreage of other classes is taken out first—which tends to have a less depressing effect upon corn production than might be expected.

3. Our last and obvious possibility is to do away with corn altogether. Such an eventuality as this at first sight appears unthinkable, yet many agriculturists have given serious consideration to the idea for many years. Sherman E. Johnson pointed out in May of this year that the elimination of corn will depend upon agronomists developing a system of grassland farming that will yield as high a return to farmers as a corn-hog system (*5*). It is worth recalling here that the 1940 acreage of corn in the five principal Corn Belt States was the lowest in 40 years. At the same time the acreage of tame hay has increased about 9 percent over what it averaged from 1928 to 1932 (*5*).

No one can foretell the future and predictions concerning corn, involved as it is with remarkably complex social and economic forces, are certainly unwise in view of the chaotic international situation. Yet, as Secretary Wickard wrote only a short time ago, "We are engaged in a great defense program . . . which is so important that it obscures the less valuable of our previous concerns and emphasizes the value of our more enduring tasks . . . " (*12*).

It would indeed be strange if corn, a truly American crop and foundation stone of the greatest food chain in America, were found wanting in the enduring task of readjustment in old and wasteful systems of agriculture unsuited to America. Whether corn remains a heritage or becomes history lies in the future of a strangely changing world.

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L. L. Harrold writes in September of "Rains on the Plains." He gives evidence of the effect of certain crops and certain methods of cultivation in "taking the top off a flood peak."

A good pasture, practically free from weeds, in the Corn Belt.

BUILDING A SOD DEFENSE

By C. R. ENLOW [1]

OUR boys need to be conditioned for defense. So does our soil. We have abused our soil by misuse and by neglect until it is eroded and has lost productiveness. Now it is in need of overhauling. Richard Bradfield, while at the Ohio Agricultural Experiment Station, pointed out that loss of organic residues from continuous cropping has been the means of destroying the natural structural aggregates of the soil so that, in many instances, 25 to 30 percent more soil is crammed into a cubic foot than in early days when virgin soils covered our land. This has reduced ventilation and water storage of the soil; it has increased flood hazards, and it has intensified periods of drought.

In England, nearly 4,000,000 acres of grassland have been plowed since 1939—this in addition to the more than 8,000,000 acres reported in 1939. England has been following a grassland agriculture for some time and the soil is in good condition; it can be plowed to produce food crops for several years without serious results. We in the United States are only beginning our grassland program, and it takes time to rebuild soil or condition it for intensive cropping. Fortunately, we have immense acreages of cropland, a wonderful defensive resource. But it isn't in top-notch condition, or even good condition, and we should use all our efforts to improve it so that we may be prepared for whatever is in store. Being ready for any emergency is a tremendous advantage.

We have seen a considerable increase in the acreage of grass, legumes, and other sod crops throughout our country in recent years, and it is now generally recognized that this is an ideal way to preserve and actually improve our soil. Very little information is available, however, from the economic angle. If we hope to make progress with the soil improvement work, we must learn whether or not such a practice is profitable. It seems worth while to give here a few of the recent developments to indicate the possibilities in increased income, as well as soil defense from grassland farming.

With farmers everywhere intensely interested in utilization of grass and legumes as silage and hay, certainly it becomes apparent that they are interested in growing more of these crops. Furthermore, we cannot accept this movement on the basis of soil conservation alone, as no farmer can afford to change his cropping system to save his soil if it is a losing proposition financially. Considering the extent of the interest, it must be that the farmers realize that they can produce dairy products at a lower cost—otherwise the interest would not be so general. Evidently, the grassland type of farming, which is so essential in any soil defense program, has economic as well as conservation possibilities.

For some time it has been recognized that soil erosion and wastage is the consequence primarily of wrong land use. Our Service has made a real effort, and with considerable success, to gain general recognition of this fact. While we have been working to gain recognition of waste by erosion, however, we have noted a general impression to the effect that sloping and eroded lands need only be seeded to sod crops and they will immediately become a source of profit. This impression must be pointed out as erroneous, as our sod crops need plant food and moisture in order to make good growth just as do grain and other crops. We, all of us, have made an attempt to place a tremendous acreage of land in permanent pasture and meadow, but we cannot expect it to be profitable without the addition of plant food in the

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form of fertilizer, lime, manure, and other plant food carriers. Much of this land should be given further consideration, because from the standpoint of the farm economy it is still a losing proposition. Undoubtedly, a large portion of the acreage should be planted to forest trees..

If we expect to maintain our more productive lands in good condition for generations to come, we must make up our minds to follow a program of soil maintenance and improvement rather than one of continuous depletion. This means that the sod crops should be brought into the rotation with cultivated and grain crops. Already it has been proved that such a change is essential from the standpoint of preservation of the soil, on land subject to erosion, and more evidence is accumulating to show that this practice is profitable. It may turn out to be fortunate that we are forced by soil erosion to change to more profitable soil-management practices.

In the June issue of Soil Conservation, Mr. Semple gave some pertinent information in an article entitled "A Safer Use of Land." He pointed out that results from the New Jersey and Ohio Experiment Stations showed that grass and legume silage cost considerably less to produce than corn silage, and in addition have a higher protein and vitamin content. In the Wisconsin Agricultural Experiment Station Circular No. 299, entitled "Grass Silage," it is stated that where a legume silage is fed with legume hay, or even with mixed legume-grass hay, the grain mixture may be merely home-grown grain like corn and oats, which will make a balanced ration for all but very high producing cows. Experimenters at the station do not find that legume or mixed legume and grass silage gives any increase in quantity of milk produced over good corn silage in winter rations, yet undoubtedly there is an increase when this ration is compared with the poor or only fair rations frequently fed to dairy cows. It is pointed out that alfalfa silage contains an unusually large amount of carotene, which is largely responsible for the golden color of milk. Feeding silage with a high carotene content naturally increases vitamin-A content of milk.

In Minnesota a common ration fed to dairy cows is 40 pounds of corn silage, 10 to 12 pounds of alfalfa hay, and 8 pounds of grain daily. Mr. Hanson, extension dairyman of the Minnesota Extension Service, recommends 25 pounds of corn silage, 20 pounds of alfalfa hay, and 4 pounds of grain. This is a much more economical ration, and according to Mr. Hanson is quite as productive. It is immediately apparent that the use of such a ration, if widely adopted, would have a revolutionary effect on the cropping program of the State by materially decreasing the corn acreage and increasing the acreage of sod crops.

In our Southeastern States, an effort is being made to develop low-lying lands into pasture. Much of this land at present is in brush, is in need of drainage, subject to over-flow, and has very little practical value in its present state. When conditioned and put in pasture, one acre will produce as much feed as approximately 15 acres of hill land pasture. Under these conditions it seems quite logical, from the standpoint of soil conservation and proper land use, that the bottomland be prepared for pasture so that much of the hill land, which is responsible for the silting and poor drainage found in the bottomland, can be planted to trees and protected from grazing.

On the other hand, with the acute shortage of crop land per farm in the Southeast, much of the hill land will have to be planted to kudzu in order to secure an adequate supply of hay. Already 200,000 acres of kudzu have been planted in the Southeast, mostly on land that is not adapted to the production of row crops.

Cotton land under a pasture cover of red clover and grasses.

When the earlier plantings were made, it was assumed that the land would remain permanently in kudzu, but it has been shown more recently that the kudzu can be plowed in strips and corn grown for one year. Thus the kudzu is allowed to recondition the land—and it will do the job by the end of the growing season provided corn cultivation is not carried too late in the season. Corn yields following such a rotation have been increased fourfold.

It is a good old American custom to try to standardize methods and procedures before sufficient information is available to make them logical or sensible. Three years ago it was thought that all steep lands were unsafe for cultivation. Already the kudzu-corn rotation has proved an exception to this general rule. Undoubtedly we shall find it necessary to modify our ideas as we progress in a soil defense program, but at the moment all evidence points to a more extensive use of sod crops not only on the hill lands to prevent erosion but on the better lands to maintain productivity.

An illustration of what can be expected of sod crops on really good land may be seen in the following: It has been found in Morgan County, Utah, that the returns from irrigated pasture are fully equal to and in many cases exceed those obtained from such cash and hay crops as peas, cabbage, sugar beets, potatoes, small grain and alfalfa. According to C. R. Richards, the county agent, dairy records in Morgan County show a return of $100 to $120 in butterfat production per acre of irrigated pasture. Seventeen pastures lying within the Morgan Soil Conservation District provided grazing for 3½ to 5 animal units per acre for a period of 5 months during the growing season. The usual period of grazing on irrigated pasture in this locality is from May 1 to October 1. At Mount Pleasant, Utah, as much as 1½ tons of hay per acre was cut from some of the pastures, and in addition a considerable amount of late summer and fall grazing was obtained. Pastures used solely for grazing gave approximately the same amount of forage as those at Morgan.

In Circular No. 559 of the U. S. Department of Agriculture, entitled "Review and Discussion of Literature Pertinent to Crop Rotations for Erodible Soils," I attempted to show the advantages of sod in the rotation for soil improvement, and also from the economic standpoint. Additional data are slowly becoming available. In the meantime, we must do our best to encourage soil defense by all possible means, as this is one extremely important phase of National Defense.

THIS COUNTY SUPPORTS ITS DISTRICT

By HARRY B. CARROLL [1] and FRANK B. HARPER [2]

Beardslee and Gleason will lose no more of their precious bottomland to the Wynooche, for this live-willow brush mat put in by the Montesano Soil Conservation Service CCC camp already was doing its job of protecting that land effectively when this picture was taken in the fall of 1940.

GRAYS Harbor County in southwestern Washington is backing its farmers' soil conservation program with dollars. The county commissioners have set aside $4,800 a year for erosion control and related land-use improvement along streams and on watersheds. Nor is this all. Through the Montesano-Elma-Oakville Soil Conservation District this Pacific Coast county has made available to landowners the $162,000 WPA flood control project so that they may have assistance on flood control jobs involving drainage and other work which they plan with the help of Service technicians.

The county's interest in such things as flood control, erosion control and timber crop improvement is not altogether altruistic. County Commissioner Harold Kellogg of Montesano expressed it this way:

"Such work should save tax valuation. Our problem here has been mostly one of soil erosion due to the rapid rise and fall of our streams. We have been very pleased with the work of the Soil Conservation Service CCC camp in successfully riprapping with live willow brush mats nearly three miles of bank along the Wynooche River, and with the tree planting and other accomplishments. Now we hope that through co-

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Reforestation is the district's answer for some of its timberland problems. Enrollees are here planting Douglas fir seedlings on cut-over, burned-off land, so that a new lot of merchantable timber may be harvested in the future where now nothing but brush and other vegetation grow.

operation of the soil conservation district with other agencies, we can stop the destruction of our farm lands."

The CCC camp, now assigned to the district, began operations in the fall of 1939. The enrollees' initial job consisted of streambank erosion control along the Wynooche and was designed for demonstration purposes. The Wynooche is one of the county's seven major fast-flowing streams. Four years earlier a survey by County Agent Arthur F. Kulin had revealed that 242 acres of Grays Harbor County's best bottomlands had tumbled into its streams in 1935 alone. This soil, for the most part, was carried down into Grays Harbor to aggravate the silting situation that in 5 years' time cost the Government $3,800,000 for dredging. Grays Harbor is important for lumber, fish and other commercial shipping. As only 1 acre in 10 is tillable bottomland, the 285 acres that were either washed away or covered with gravel in January and February 1935 represented more than 1 percent of the farmers' really good farmland lost forever in the single season. There was mixed comfort in the fact that the average annual streambank erosion damage is but a little more than half as much as it was that year!

Farmers and the county commissioners alike watched closely the work done by Superintendent C. E. McFadden and his CCC enrollees. They drove up the Wynooche after each of the four or five "rises" during the 1939–40 winter and spring. They saw that the willow mats held and started growing where earlier control efforts had been unsuccessful. In March 1940, the eastern Grays Harbor County landowners, and a few in southwestern Mason County, voted 148 to 2, to form their soil conservation district. It includes more than 300,000 acres of the watersheds of the Chehalis, Wynooche, and Satsop Rivers. Already, farmers in neighboring parts of the county are taking steps toward extension of the district to their areas.

The district's problems and opportunities were by no means limited to the important streambank erosion control, cut-over and burned-over timberland planting, or to pasture improvement and conservation farming practices on the bottoms and gravelly benches— this soon became apparent to the supervisors and to the Soil Conservation Service men they asked in to assist them. They rolled up their sleeves for work—Chairman W. D. Olsan of Satsop, Vice-Chairman Clarence Glenn of Montesano, Secretary H. S. Swenson of Malone, and Supervisors J. H. Taylor of Montesano, and P. S. Austin of Oakville—as did District Conservationist Floyd Otter, Farm Planner F. C. Griffin and Engineer Robert Miller. These are some of the problems they encountered:

Expensive siltation of Grays Harbor at the mouth of the Chehalis River. Decreased soil fertility through leaching by 52 to 86 inches of rainfall a year. Sheet and gully erosion on the logged and burned timbered slopes and the bottoms. Depleted farms with high mortgages, poor drainage, noxious weeds on farms and along county roads and on tax-title lands. Too

Under the district program, drainage, pasture improvement, and other good land-use practices are being developed to produce fertile bottom pasture like this for the area's important dairy industry.

many small-farm units and part-time farmers. Need for more grazing land and the difficulties involved in developing idle logged-off lands for grazing. Inadequate fire protection. Idle and tax-delinquent logged-off lands. Premature cutting of second-growth timber, and cascara bark theft. Difficulties in marketing second-growth timber. The need for summer irrigation—most of the rainfall comes in the winter. Unsatisfactory farm financing. Settlers so scattered that the cost of roads sometimes exceeds the value of the farms they serve. Low production from gravelly bench prairie lands farmed because the fertile bottomlands had been washed away or are unfit through lack of drainage. River pollution from pulp mill waste and sewage, harming the salmon run. Rodent damage to crops. The difficulty of getting clover stands where legumes are required. The need for rural electrification.

Chairman Olsan had reason enough to remark: "I am beginning to see that this soil conservation work we are in is a big thing. At first, I merely wanted to get some work done on these rivers. Now I see that the work we are starting may decide the future of the Grays Harbor country—whether it will be the home of thousands of prosperous people or of a few roving nomads and yapping coyotes."

As the first year of operations draws to a close, the Montesano-Elma-Oakville District's scoreboard does not look so bad, at that:

WPA crews have made much progress in clearing the Wenzell Slough channel of logs and other debris. One of the two farmer "cats" they are using was donated and the other is rented by the county. Soon the crews will be ready to start similar drainage and bank control work on the Mox Chehalis and on Sherwood Creek. Meanwhile, the county has agreed to do a highway erosion control job by damming an old millrace through which floodwaters of the Chehalis River have been pouring into the Wenzell Slough area. When the Wenzell Slough work is completed, there will be less water on this flat land during the high-water period. This will permit development of 600 acres of some of the richest land in the county, and also more profitable use of the 500 acres or so of fertile pasture and cropland already developed. These figures are significant in a locality where the usual size of a self-sustaining dairy farm is 30 to 60 acres. The farmers themselves will maintain the ditch, fill in old gullies made by flood waters, and carry out approved farming practices on their lands.

The district has helped farmers in the planting of 225,000 trees. In addition, 75,000 trees were planted on approximately 85 acres of the Montesano city watershed, with the city providing $450 for 50,000 of the Douglas firs and Port Orford cedars. The remainder were furnished by the district from the Soil Conservation Service nursery at Bellingham.

"This plan is part of a dream that I have had for a long time," Mayor J. E. Calder said just before his term expired. "I am proud to have had a part in its fulfillment."

The Elma high school students have bought 200 acres in the district. The land was sold to them for the nominal sum of $25 by the Mason County Logging Company with the idea of encouraging the permanent school forest project. The district supplied the 7,000

cascara, yellow pine and Douglas fir trees that the senior men, mostly Smith-Hughes agricultural students, planted this spring to start off the 3-year planting program.

In cooperation with the Montesano Chamber of Commerce and the Pomona Grange, the district has agreed to sponsor a fire-protection and reforestation educational program in connection with the 120,000 acres of logged-off timberland on which the Weyerhaeuser Timber Company recently undertook a long-time reforestation and fire-protection program in order to prove the practicability of developing future timber supplies.

The district carries on a definite pasture improvement program, by furnishing seed of uncommon varieties of grasses and legumes for trials made in cooperation with interested farmers.

It is cooperating with the Farm Security Administration so that the farm plans of FSA clients conform with best use of the land, with loans contingent upon proper handling of the land.

Since the district was organized, 120 farmers have worked out complete soil- and moisture-conservation farm plans with the technical assistance of the Soil Conservation Service district staff and that of the CCC camp and including Farm Planner E. E. Rowland, Agronomist Earl A. Lewis and Forester Montague W. Easton who are under the direction of the Tacoma area office headed by Area Conservationist Orlo W. Krauter.

The district has offered timber management and marketing service to farm timber owners, to prevent forest destruction and encourage more orderly and cooperative marketing. This is important especially during the national defense emergency when demands for forest products might lead to destructive cutting for immediate profit.

Recently the district has sought the approval of Army Engineers for flood- and erosion-control work on the Chehalis River, a navigable stream. In the meantime, the soils and conservation surveys being made in connection with the district program are in demand by the county commissioners for making county land classifications and for use in zoning studies.

"There is a lot of valuable land going down our streams to the ocean," Chairman Olsan pointed out, "and we have been clearing poorer land in its place, which in turn goes down the streams. Down there, it has to be dredged at great expense. It is important to learn to take better care of the land we have. We can't treat isolated spots successfully, yet we must treat everybody alike. This cooperative approach makes for friendship and encourages unit action." He stressed the sheet erosion on hill lands, farms that are too small and the part-time farms, the farmers' flood control problems that are too big for them to handle unaided, and the district's desire to organize a weed-control district and to do something worthwhile in timber marketing.

"If the inhabitants of an area are going to control the community," he added, "they must be self-supporting."

Supervisor Glenn summed it up in these words: "Our major problem here is reforestation, river erosion and soil conservation. I have seen many thousands of acres wash away. It is washing away now faster than it ever did, for the timber is gone and the freshets come quicker. But there is no doubt that something can be done about it through our district."

"We are trying to learn to help ourselves," Supervisor Austin said. "It is not alone a matter of getting government help, but to do it ourselves. It seems to me our organization should be able to step in and give relief to a man who is trying to conserve his soil." Then he added, nodding toward his son standing nearby, "My main interest is in Ted. It doesn't mean so much to me, but I known what he is facing."

C. C. Wade has seen all but four or five of his 21 acres of bottomland—for which he once was offered $200 an acre—slip into the Wynooche River.

"I never saw anything done on the river that looked as good as this work," he said of the CCC riprapping. "I really believe this will stay; for, as far as that mat has been put in, it hasn't cut a particle. There are not many who have not lost land in this bottom. If something had not been done, the river would have been over here to my barn in another couple of years, taking neighboring land, including the road, with it."

Mr. Wade's neighbors told much the same story. Furthermore, a similar story may be heard also in the western part of Grays Harbor County, along the Pacific Ocean down the Humptulips and Quinault Rivers and landowners in those areas have taken action to petition the State Soil Conservation Committee for permission to join the Montesano-Elma-Oakville District.

With future broadening of territory in view, the supervisors have voted formally that the entire county be given an opportunity to come in with their district. Like the county commissioners, they are interested in the total welfare of a still comparatively new area, the soils, climate, geography and other resources of which mark it as a land of great opportunity for proper agricultural development.

DOWN IN PUERTO RICO

Ready for the take-off: J. J. Stroup; U. S. army pilot (unidentified); G. L. Crawford; Capt. Ramon Guas, U. S. army; G. N. Sparrow, and J. J. Landron.

The Soil Conservation Service in Puerto Rico and the Virgin Islands has been cooperating with the Army and Navy at Borinquen Field. It has been analyzing soils, helping to suppress insects through cooperation of the Insular Bureau of Entomology, and directing the planting of grasses for erosion control on the Post.

The Service has also cooperated at El Morro by supervising the planting of grasses on land where soil had been removed. A survey of Camp Buchanan was made and the sodding of the parade grounds and other areas for the use of soldiers is being supervised.

At Camp Tortuguerro the Service is directing the planting of grasses on parade grounds and is working to check the blowing of sand by developing a thick vegetative cover.

At St. Croix, Virgin Islands, the technical staff is assisting the Army by supervising the planting of sod on the shoulders of runways.

Many employees of the Service in Puerto Rico are members of defense committees.

CARTOGRAPHIC DIVISION AND NATIONAL DEFENSE

(*Continued from p. 45*)

mounting board in such a way that it can be pulled into position and shape while wet.

All of the aerial negatives that have been taken for the Soil Conservation Service in the last 6 years, and all those taken in the eastern part of the country for the Agricultural Adjustment Administration in that time, are stored in Beltsville adjacent to the photographic laboratory, so that immediate photographic printing service is available. During the last 5 months, 48 orders have been filled by the laboratory to meet requests of the War Department. Deliveries have been as follows: 5,020 contact prints; 462 ratio enlargements; 528 index sheets; and uncontrolled mosaics of two areas in Virginia amounting to some 300 square miles.

The rapid method of mapping developed here, many features of which have already been adopted by other departments, is thus far one of the major contributions of the Cartographic Division to National Defense. Materially greater contribution probably will be made if Defense requirements make it desirable to map a large expanse of this country very quickly, for here, in addition to the mechanism for such mapping, we have a force of 170 men trained in this new and highly specialized field. With the equipment on hand, and with the addition of sufficient untrained personnel, working under these men, it is easily possible for this organization to turn out 15,000 to 20,000 square miles per year of large scale planimetric maps. It is in this field that the Cartographic Division can be of maximum benefit to the country.

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

HUNGER SIGNS IN CROPS, A SYMPOSIUM. Edited by Gove Hambidge. American Society of Agronomy and National Fertilizer Association. Washington, D. C. May 1941.

A vote of appreciation goes to the two great societies sponsoring the compilation and publication of a volume timely in the extreme as an aid in wartime production of the important crop plants of the United States. A symposium such as this, originating in the laboratories and experimental fields of top experimenters, and edited and arranged by our man of Yearbook fame, Gove Hambidge, is bound to be most useful to farmers and soil conservation technicians. Its subject, nutritional deficiency signs in crop plants, is so close to the health and heart of all of us that interested readers are likely to include not only raisers of field crops, but fruit growers, gardeners, and even the apartment-house dweller with a geranium on the window sill. In a way it seems too bad that the book could not have been extended to include many plants other than crops; yet on the other hand its true objective, soil improvement for better staple crops, is so much a part of soil conservation work that the symposium quickly becomes a valuable key for handy reference wherever soils are used for any one or several of the major crops of the country.

Fourteen authors comprise the symposium, all eminent scientists in the field of experimentation and knowledge having to do with plant growth and the chemistry of soils. Aside from the wealth of authentic information regarding hunger signs in plants, the volume taken as a whole has two outstanding features making it especially valuable to the grower who has no technician at his elbow to act as an interpreter—the language is simple and the approach direct, and the more than 200 illustrations (109 color plates, reproducing both photographs and paintings, and 94 black and white halftones) show starvation signs so clearly as to make them easily identifiable by anyone in the least familiar with garden, field or orchard.

The book starts off with "Why Do Plants Starve?" by George D. Scarseth, soil chemist of Purdue, and Robert M. Salter, Director of the North Carolina Agricultural Experiment Station; thus at the very beginning we find an extraordinarily lucid tabular arrangement showing the raw materials used by plants in growth—if the plants can get them—and approximate equivalents in everyday terms. For example: A "trace" of copper is needed per acre—equivalent to 25 feet of No. 9 copper wire. Again, 50 pounds of magnesium per acre is required by corn for production of 100 bushels—170 pounds of Epsom salt. In "Why Do Plants Starve?" the two authors review separately each of the raw materials used by plants, and also soil acidity intensity, for "a better understanding of what these nutrients do for plants and why plants may starve for lack of them." The elements reviewed are water, oxygen, carbon, nitrogen, potassium, phosphorus, sulfur, magnesium, calcium, iron, manganese, boron, zinc, and copper.

Another excellent feature of this book is its practicality, from beginning to end. Crops are dealt with separately, by authors who are specialists, so that no one of them is slighted as to details of plant-nutrient deficiency, and there is no repetition. Tobacco is first, with descriptions of plants in different stages of growth and showing symptoms of malnutrition because of the lack of one or more of the elements essential to healthy development. Twelve color plates and eleven halftones are included with this chapter to illustrate hunger signs in tobacco, some of which are often mistaken for disease symptoms.

Deficiency symptoms of corn and small grains are described in one chapter by George N. Hoffer, plant physiologist and specialist in soil improvement methods. He points out the symptoms of nutrient deficiency in plants as the "language" of plants in indicating "the nature of the distress affecting them." He states that corn plants in practically all parts of the United States show symptoms of nitrogen starvation, and that plants weakened by malnutrition are most susceptible to diseases, insects and unfavorable growing weather. In view of the present defense production plan, this chapter is important as an on-the-ground tool in the cornfield, the wheat field, oats, barley, rye, from one end of the country to another. In addition to pointing out visible signs of hunger—yellowish leaves on corn, or leaves streaked or purplish—wheat stunted, with weak stems or too dark a green and deadened tips—the author has included a valuable set of chemical tissue tests consisting of simple directions for testing corn and small grains for nitrates, phosphates and potassium. A full-page photographic chart is included to show what part of the plant is to be tested for each of the raw materials necessary for proper growth and yield. The farmer need not be a chemist to perform these tissue tests; the author is of the opinion that no grower of corn can afford to neglect supplying himself with the materials for making the simple test for nitrates.

The subject, plant-nutrient deficiency symptoms in the potato, is treated by H. A. Jones and B. E. Brown, both of the Division of Fruit and Vegetable Crops, Bureau of Plant Industry. The "cotton chapter" is by H. P. Cooper, director of South Carolina Agricultural College, and here the treatment is slightly different in that other raw materials enter the picture and the approach is somewhat more technical. "Plant-Nutrient Deficiencies in Vegetable or Truck-Crop Plants," by J. J. Skinner of the Bureau of Plant Industry, is a long chapter including 14 halftones and 11 color plates showing in truly lifelike manner those danger signs in garden peas, cabbage, tomato, lettuce, turnip, squash, cucumber, radish, beans, cauliflower, and onion, which are so familiar to vegetable growers and amateur gardeners. Some useful notes on truck-crop soils and corrections of plantfood deficiencies are given at the end of the chapter.

Nutrient deficiency symptoms in deciduous fruits, by O. W. Davidson, biochemist in horticulture at the New Jersey Experiment Station, is a long chapter treating chiefly apple trees, peach, and strawberries, and including 13 color reproductions of paintings by Mary E. Eaton. It is written in a lucid style and is of a type in other ways to be used by growers without the aid of technicians. Citrus fruit malnutrition symptoms are described separately by four specialists, A. F. Camp, horticulturist of Florida; H. D. Chapman, agricultural chemist of California; George M. Bahrt, soil technologist of the United States Department of Agriculture; and E. R. Parker of the Citrus Experiment Station, University of California.

BOOK REVIEWS AND ABSTRACTS

continued

The chapter on plant-nutrient deficiency symptoms in legumes, by E. E. DeTurk, soil fertility expert of the University of Illinois, will likely prove most interesting to Soil Conservation Service technicians and thousands of cooperating farmers, because of the nitrogen-fixation ability of these plants and their extensive use in soil conservation programs. It appears that the very nature of the legumes sets them in a class apart in the matter of easily identifiable hunger signs—the author points to potassium as "the one common element a deficiency of which is shown by easily recognizable symptoms that are well known because of their common occurrence in a wide variety of legume crops." Pointed out also is the fact that the problem of soil acidity is definitely related to nitrogen nutrition of legumes, and the author discusses the problem in its relation to the calcium requirements of the leguminous crops. Apparently, much remains to be learned about the nutrient deficiencies of legumes, and some interesting problems for study are pointed out in this article.

Each of the articles of the symposium includes a selected reference list, not extensive, but "choice." Likewise, keys for quickly identifying a deficiency by its symptoms are given in the chapters dealing with hunger signs of tobacco, potato, cotton, tomato, deciduous fruit trees and citrus trees.

DEFENSE—ONE YEAR. Office of Emergency Management. Superintendent of Documents, Washington, D. C. June 1941.

The year just passed has been ten years long to a United States anxious and determined to "get going." Nowhere have we seen the figures that might represent even remotely the loss and expenditure of human power and efficiency through the individual and collective anxieties of the twelve months just gone. Such figures can never be compiled, of course, and the losses will best be forgotten; but much can be done to erase the worry of waiting—read "Defense—One Year" and learn the actual facts about the tremendous ramifications of building for defense, and then—look forward and upward. Much delaying criticism can be avoided by a people well informed in a time of emergency.

In this, their first yearly report, the OEM gives us the facts and the figures. They want us to know what we are paying for our great armament-for-defense program, what has been done and is to be done about getting the essential raw materials, what the defense housing program consists of, the meaning of and the reason for subcontracting, and what lies ahead in the way of doubling, trebling, quadrupling, fivefolding the monthly output of machines and munitions.

We are informed here of payments already made, contracts on order, and appropriations for future expenditure for naval ships and aircraft, ordnance, bases and stations and fortifications, industrial facilities, equipment and materials and construction, pay rolls. For purposes of aiding our government by informing others, and purposes of morale, it is important that we know the facts.

The facts about the building of plants for war-time production, and getting the raw materials to feed those plants and the skill to man them, may be pointed to as evidence that the "first year is the hardest." Likewise, after studying this report we realize that the Defense Program has not merely grown of itself, Topsy-like. Purpose is clearly apparent in the organizational procedures behind the tremendous production movement now in full swing. The OEM's report is not a propaganda paper in any sense of the word; it is a simple statement of the facts as to what has been done, is being done now, and will be done in the next twelve months, in the way of actual and tangible supplies and armaments, to safeguard our country from dangers real and threatening.

Toulouse geese, Dorset sheep, and Berkshire hogs in Harford County, Md.

As our defense efforts progress, the demands for labor-saving devices on farms are sure to increase. Farmers have been called upon to augment the supply of meat and dairy products for Great Britain. Good pastures are tops in reducing the labor and other expenses involved in producing livestock. Several classes of livestock that we cannot keep together in the barn or feedlot can be grazed on the same pasture very satisfactorily. At the same time our soil is definitely safe from attack by its enemies as long as a productive sod is kept growing on it.

U. S. GOVERNMENT PRINTING OFFICE: 1941

Excerpts from recent addresses by Honorable Claude R. Wickard Secretary of Agriculture

Overshadowing everything is the world crisis. The times through which we are passing will decide what kind of a future the United States will have. We are determining whether we intend to remain a great democracy, and perhaps a great world power . . .

There is no sense in producing for delivery at the bottom of the ocean . . .

I don't think the American people want to live in a world run by the Nazis. I don't think they intend to live in a world run by the Nazis. A world run by the Nazis means the destruction of freedom and democracy in the United States. We'll do whatever is necessary, to protect our freedom and our democracy . . .

So far as organization is concerned, farmers are in far better shape today to meet the economic consequences of war than they were in the First World War. It was then that the Extension Service and vocational education were born. All of agriculture's service organizations, including the cooperatives, have seen their greatest growth in the years since that war. Newer agencies in the Department of Agriculture—the Triple-A, Soil Conservation Service, the Farm Security, Surplus Marketing and Rural Electrification Administrations—have all placed additional emphasis in recent years on the administration of farm programs by farmers themselves. Now that war is once again aflame in the world, farmers are looking to these very agencies—both government and non-government—to help them avoid the economic pitfalls which lie ahead . . .

Our first line of defense is a well-fed, healthy people on the home front . . .

What will happen to the farmer after the war will depend entirely on who wins the war, and how well the farmer is prepared to cope with problems as serious as any that have yet confronted him. To prepare properly, we are going to have to face the future realistically. We are going to have to be prepared to see our export markets drastically reduced, and then devise means of building them up again. We are going to have to produce more food and feed for home use in the export crop areas. And last, but far from least, we are going to have to guard against the depletion and destruction of our soil that took place in the First World War. Farmers can best combat these obstacles by working together, by using their programs, by thinking ahead . . .

If the United States acts quickly enough and effectively enough the striking force of this country and of the British Empire can check Hitler. If we are too late, the striking force of the rest of the world, under Hitler domination, is likely to converge on us . . .

For months now, I have had the feeling that a large part of the world will be starving after this war is over. Many countries will be looking to the United States for food and they'll really listen to what we have to say if we can feed them. I've got a pet statement that I've made a good many times—"Food may not only win the war. It may decide the peace too." . . .

As soon as possible, we ought to build up reserves of almost every vital food. I am not worried about not being able to use it . . .

After this emergency is over, perhaps the world will be ready to look at international trade in raw materials in a more sensible way than it has in the past. The struggle to give away wheat, cotton, and other real wealth is just as senseless as world wars . . .

UNKNOWN to the Old World before the discovery of the New, its origin buried, perhaps forever, with the ancient cultures of the Americas, the great grass corn now ranks second only to wheat as the most important food plant in the world. No other crop has so wide a distribution, none except wheat exceeds it in acreage, and for the United States no other crop is as valuable as this extraordinary plant developed and tended by American aborigines.

Of tremendous importance as food for man and his livestock, corn also ranks high for quail, doves, pheasants, grouse, waterfowl, and more than a hundred other species of wild birds and mammals.

But for all its excellent attributes, corn remains a dangerous crop for certain soils, requiring special soil-conserving and cultural practices to produce it without damage to the land.

—William R. Van De